# *Description of the* Fossil Bones *of the Megalonyx, discovered in* "White Cave," *Kentucky.* By R. Harlan, M. D.

[Read March 8th, 1831.]

## Megalonyx *laqueatus.*

For many years it was ascertained that the collection of fossils in the cabinet of the late Mr. Clifford of Kentucky, contained some of the remains of a Megalonyx. On the death of this gentleman, his whole collection passed into the hands of Mr. Dorfeuille, proprietor of the Cincinnati Museum,—who added a very extensive collection of fossils of almost every variety, principally from the Basin of the Mississippi. During the summer of 1829, this collection was offered for sale; when my estimable friend *John Price Wetherill,* Esq. with that distinguished liberality which he has so repeatedly displayed towards the sciences and those who cultivate them, authorized me when on a visit to Cincinnati in the autumn of the same year, to purchase these invaluable reliques, which, together with other admirable contributions in this department, he has caused to be arranged in the cabinet of the Academy of Natural Sciences of Philadelphia.

The fossil bones which form the immediate subject of the present dissertation were labelled "White Cave," Kentucky; being one of those saltpetre caves

so numerous in the limestone formation, in the states of Kentucky, Tennessee, and Virginia. One of them named the "Mammoth Cave," Kentucky, is said to extend thirteen miles, and runs under Green River. During the late war the United States government was supplied with nitre from these caves, which salt, it is said, is not regenerated so soon as usual in other countries; the atmosphere within them is exceedingly dry and antiseptic; Indian Mummies, which consist of human bodies simply desiccated, together with their ornaments, have been frequently discovered in a state of high preservation; and bones of the existing species of animals have occasionally been observed.*

* From a communication received from my intelligent friend Dr. Black, late of Kentucky, we copy the following extract relative to the *White Cave*.

"The Cave is located in Edmondson County, Kentucky, on the Southern bank of *Green River*—130 miles distant, following the course of the stream, and 50 miles, in a direct northern line, from the Ohio river—120 miles S. W. of Lexington. It penetrates the second or upper bank of the river nearly at its summit, about half a mile from the mouth of Mammoth cave. The entrance dips a little below the horizon, and is 8 or 10 feet deep, and is only sufficiently large to admit of the simultaneous ingress of one person feet foremost. The first chamber is of an irregular elongated oval shape, with a low, flat, uneven roof, seldom allowing a grown person to stand erect. Water continually dropping from the ceiling keeps the floor very wet, this is irregular, and covered with a thin layer of alluvial soil—mud or clay and gravel. The second chamber differs from the first in having the ceiling covered with quill-like stalactites, and its floor more level, is intersected with small channels of running water, so transparent, as to be scarcely perceptible.

Along with the remains of the Megalonyx, we have received portions of skeletons of the Bos, the Cervus, the Ursus, and a metacarpal bone of the human species. The remains of the Bear alone appear to be nearly as ancient as those of the Megalonyx. Strictly speaking, these bones are not fossilized; they retain a very considerable quantity of animal matter, but are much more brittle and lighter than recent bones; most of the articulating surfaces are still more or less covered with cartilage: they are mostly of a yellow ochreous colour: it is stated that they were found on the surface of the floor of the cave; whilst those of the Megalonyx Jeffersonii were buried two or three feet beneath the surface, and are completely fossilized; they are still in very good preservation in the cabinet of the American Philosophical Society.

The remains of the new Megalonyx, consist of two claws of the fore feet; a radius, humerus, scapula, one rib, and several remnants; os calcis, tibia, a portion of the femur; four dorsal, and one lumbar vertebræ; a portion of a molar tooth; together with several epiphyses: the bones being portions of the skeleton of a young animal, are occasionally imperfect at their extremities.

The third chamber is more regular than either of the others, and is chiefly distinguished by an irregular pile of limestone, which has evidently fallen from above, and very probably closes the passage to other chambers. Saltpetre, so common in other caves, has not been detected in this."

In the same collection there are a humerus nearly perfect, and a metacarpal bone of an adult animal of the same species, disinterred subsequently at that almost universal cemetry of fossil quadrupeds, "Big-bone lick."

The bones of the fore arm and fore foot, together with a single tooth of the "*Megalonyx Jeffersonii*" discovered in 1796 in a cavern in Green Briar county, Virginia, (vid. Cuvier Anim. foss. vol. v. part 1. ed. 3. p. 160.) are the only portions of the skeleton of this genus hitherto obtained. On comparison of the similar parts of the skeleton of the new animal, they will be found to display strong characters of specific distinctions.

In addition to the Megatherium and Megalonyx, so elaborately described by Baron Cuvier in his "Ossemens fossiles," this author has furnished us with indications of the existence of two other fossil quadrupeds of the order Edentata; one of these he refers to the genus "Manis," but of immense magnitude, when compared to the largest of that genus now existing, if we may judge from the size of an ungueal phalanx, which was disinterred in the vicinity of Eppelsheim, canton of Alzey, on the Rhine. This fossil quadruped may have been twenty four feet long.

The other fossil to which the Baron alludes, is an armadillo, (Dasypus) more than ten feet in length, lately discovered in the alluvium of the "Rio del

Sauce" in the vicinity of Montevideo; this animal was evidently covered with scales, and its femur, which weighed seven pounds, is said to resemble in every respect that of the armadillo.

With these preliminary remarks, we proceed to the description of the bones in question, commencing with those which we are enabled to compare with similar bones of its kindred species: these latter being already minutely and accurately described in the Anim. foss., it is only necessary to note the points of dis-similitude.

1. The largest claw or ungueal phalanx, which appears to belong to the medius, in general contour resembles that of the M. Jeffersonii; but is much thicker and stronger, being one half as high as it is long, measured posteriorly; and is more curved at the point, and more abruptly arched above;—the inferior osseous plate or tubercle, is globular, and protuberant, and in place of two foramina as in M. J., the vessels entered a notch, at the posterior base of the tubercle, and run in a direction parallel to the axis of the bone, but the artery soon divides, one branch penetrating the substance of the bone, within the osseous sheath, another running upwards between the bone and nail; as is demonstrated by a groove and foramen. The osseous sheath, which rises upward and appears to have spread from the tubercle, is broken off from both sides. The articulating surface, and the whole

aspect of the bone, denotes a much more powerful instrument than the same bone of the adult species to which it is allied. Vid. table of dimensions at the end of this paper, and pl. 12. fig. 1 and 2.

2. The second claw or that of the annular finger, is smaller, and proportionably more slender, and bears the same comparison as the first to the annular claw of the M. Jeffersonii, but is a much more interesting specimen on account of the *preservation of the nail itself*, which is of a compact lamellated corneous structure, of a reddish ferruginous tint, and adheres closely to the bone beneath, and to the osseous sheath above, which is fractured and removed on the exterior side, and shows the nail passing upwards and backwards as far as the articulating epiphysis, pl. 12. fig. 3. The inferior or cutting edge of the claw or nail is canaliculate, as in the *Bradypus tridactylus*.—At the inferior portion of the claw, the corneous substance is three tenths of an inch in thickness.

On the interior surface the osseous sheath is perfect, and extends above the dorsum of the bone, vid. pl. 12. f. 4. This phalanx is much more curved than that of the M. Jeff. and differs also in its relative proportions; its height is about one third its length. Vid. table of dimensions.

*All the claws* in this species, as well as in those of the M. Jeffersonii, were evidently furnished with osseous sheaths, but are broken in the specimens of the last named species; a fact which could not be so

readily ascertained by examining the plaster casts of the bones alone; in which respect again the Megalonyx is more closely allied to the sloth.

3. The contour of the superior head of the *radius* is circular, as in the Megalonyx Jeffersonii;—and in its general aspect this bone resembles that of the last named species, but is proportionably thinner, narrower, and longer;—cartilaginous matter remains adhering to the articulating surfaces. The epiphysis from the radio-carpal extremity is lost. Vid. pl. 12. fig. 5. anterior, and fig 6. posterior view.

4. The fractured *molar tooth*, appears to have belonged to the inferior maxilla on the right side; the crown is destroyed; a part of the cavity of the root remains. The body is compressed transversely, and presents a double curvature, which renders its anterior and exterior aspects slightly convex; the posterior and interior gently concave; these surfaces are all uniform with the exception of the interior or mesial aspect, which presents a longitudinal rib or ridge one half the thickness of the long diameter of the tooth; with a broad, not profound, longitudinal groove or channel along each of its borders. It is from this resemblance to a portion of a fluted column, that the animal takes its specific appellation.

The crown would resemble an irregular ellipsis widest at the anterior portion.—The tooth consists of a central pillar of bone surrounded with enamel, the former of a dead white, the latter of a ferrugin-

ous brown colour: the transverse diameter is more than two thirds less than its length, whilst that of M. Jeffersonii is only one third less—the antero-posterior diameter is one half its length in the former, and two thirds less in the latter. The proportions of this tooth are consequently totally at variance with that of its kindred species. (Vid. pl. 12. fig. 7. 8. 9. *a.* exterior,—*b.* interior,—*c.* crown.)

5. *Os humeri.*—The portions of the skeletons of this genus, which remain to be described, being heretofore unknown, our means of comparative observation as regards its kindred species are at an end; among its congeners however, there exists ample means of comparison. In the *form* of the humerus of the *Orycteropus*, for example, we find the almost exact counterpart of that now under notice. (Vid. Anim. foss. vol. 5. part 1. pl. 12. fig. 2. Ed. 3.)

It has already been remarked that the individual whose bones are above described, was at death a young animal, perhaps one third less than the adult size; consequently the epiphyses are generally separated, and in some instances lost: this is the case with the arm bone. Being in possession of a larger and much more perfect specimen of a fossil humerus of the same species from Big-bone-lick, we shall draw our descriptions from this;—merely remarking of the former, that it bears the same relative proportions to the radius, as is observed in the same

parts in the *Orycteropus*. Myrmecophaga Capensis.—Pall. (Vid. Table of dimensions.)

The humerus from Big-bone-lick, is nineteen inches long, and is of the colour and consistence of the bones of the Mastodon from the same locality. Like the same bone in the Myrmecophaga and Orycteropus, it is distinguished by the extreme length of the internal condyle, in order to afford origin to the large muscles which move their enormous claws. This internal condyle is also distinguished by a large foramen, for the transmission of nerves and blood vessels, and to relieve them from the pressure to which they would be subjected by the action of the large muscles in their vicinity. This foramen is characteristic of all the species included in the order Edentata, with the exception of the *Sloth* and *Megatherium*. The shaft is strongly marked with longitudinal ridges and depressions; its superior head by a large external and internal protuberance; its lower head, together with the radio-humeral articulating surface, is broad and flat, with a depression or cavity on the posterior part, for the coronoid process of the ulna. The external condyle is partially fractured, but judging from the apparent curvature at its superior border, its outline is precisely the same as that of this condyle in the Orycteropus. (Vid. pl. 13. fig. 10. from Big-bone-lick. Fig. 11. White Cave, Kentucky.)

6. *Scapula.*—As a counterpart for this bone we might refer to its almost miniature likeness, the scapula of the *Myrmecophaga jubata*, to which it bears a closer resemblance than to that of any other animal. In both, the bone is nearly as high as broad; and both are perforated by a distinct foramen, in place of a notch, near the anterior and inferior angle; but they differ in the relative position of the superior and posterior angle, in the relative lengths of the different borders, and in the relative length of the acromion process. The posterior border is nearly rectilinear in the present instance, and curved in the Ant-eater. The acromion process is nearly on a line with the anterior border of the glenoid cavity, in the former; whereas this process projects below, and before this border in the latter. In both, the acromion projects a considerable distance from the coracoid process, with which it has no connection. The anterior border of the megalonyx scapula being broken, we have by dotted lines, attempted its restoration in the figure. The glenoid cavity is an ellipsis, nearly twice as long as it is broad. It is most probable that the new animal, like the Orycteropus, was destitute of clavicle, in which respect they differ from the Megatherium, the little Ant-eater, and the Sloth. (Vid. Tab. of dimens. and pl. 13. fig. 12. which may be compared with the humerus of the Orycteropus, pl. 9. fig. 6. vol. 5. pl. 1. ed. 3. Anim. foss.)

7. A metacarpal bone, which probably belonged to the same animal from which we have derived the humerus, was lately obtained by Mr. Cooper from Big-bone-lick, for a cast of which we are indebted to Dr. Dekay;—it is proportionably shorter and thicker than the metacarpal bone of the index finger of the M. Jeffersonii, to which it bears a general resemblance; it differs also in the diagonal or oblique position of the articulating surface of its inferior head, and in the greater size of its tuberosities; from the marks on its superior or carpal head, it must have belonged to the right fore-foot, and is part of a skeleton of an animal much larger and more powerful than the M. Jeffersonii. (pl. 13. fig. 13. back view, fig. 14. anterior articulating surface.)

8. *Ribs.*—The first rib of the left side has its inferior extremity broken off;—it is characterized by the extreme width of its superior head; the largeness and proximity of the two articulating surfaces; and the deep furrows for the lodgement of muscles. —pl. 13. fig. 15. The remaining rib is in a state of perfect preservation; it is much thicker in proportion to its length than that of the Rhinoceros; the superior extremity is marked, for a small distance, with a furrow for the intercostal arteries, on both the anterior and posterior borders:—the distal extremity is narrow; it appears to be one of the anterior false ribs, left side. (Tab. dimens.—and pl. 14. fig. 16.)

9. *Vertebræ.*—These consist of four dorsal and one lumbar; pl. 13. fig. 17. appears to be one of the posterior dorsal. The general resemblance is to that of the Megatherium; but the spinous process is not so long; all the processes have lost their epiphyses. The lumbar vertebra is larger and heavier, as usual. The bodies of all are perforated by one or two large foramina, running from the base to the spinal canal. (Vid. Tab. of Dimens. pl. 13. fig. 18.)

10. *Femur.*—An epiphysis, comprising the inferior head, is the only portion of this bone preserved; this however is very important, as it enables us to construct the knee joint, which in this animal presents remarkable characters. When it is recollected that the whole order of the Edentata, like that of the Monotremata, are characterized by their abnormal physical developments, the peculiar structure observed in the new fossil animal will appear less surprising.

The internal condyle is very considerably larger and projects further downwards than usual; where it is received into a rather deep concavity of the tibia. The external condyle is smaller and represents a segment of a flattened sphere, the longest diameter of which is in the antero-posterior direction; the depressed surface looking obliquely inwards, toward the internal condyle, from which it is separate nearly two inches. The pulley-like surface for the ac-

commodation of the rotula, is large, and strongly marked, though not deep. This portion belonged to the femur of the right side. Vid. Tab. Dimens. and pl. 14. fig. 19.

11. *Tibia.*—This bone is in a good state of preservation with the exception of the inferior head, which is deprived of its epiphysis. The depression on the superior head for the reception of the internal condyle, is nowise remarkable, except for its unusual depth; it would admit of extensive motion without liability to luxation. The central ridge which divides the head does not extend across the surface: the articulating surface is convex; and on its outer border, in place of the usual depression for the reception of the external condyle there exists a segment of a *flattened sphere,* projecting upwards nearly on a level with the central ridge, and in a manner isolated from the other portions of the articulating surface, leaving a considerable portion of the anterior and exterior part of this surface, irregularly raised, not covered with cartilage, and bearing marks of tendinous insertions. This sphere is rather more depressed than the external condyle, on which it moves; and projects posteriorly, much beyond the border of the interior articulating cavity. On the exterior and rather posterior lateral portion of this sphere, there is a rough and honey-comb appearance, evidently intended for the attachment, by anchylosis, of the superior head of the fibula,

which must have occupied a position nearly posterior as well as exterior to the tibia. The body of the tibia is uniform anteriorly and depressed; gradually narrowing and compressed towards the middle, and again enlarging at the inferior portion: posteriorly the body of the bone presents a broad ridge, causing a considerable projection at the upper part, and descending in a straight line from the sphere in the centre of the bone, and disappears before it reaches the middle of the tibia. By referring to the tab. of dimensions, and pl. 14. fig. 20 and 21. being an interior and posterior view—and to fig. 22. being a view of the articulating surface, a more correct idea of this anomalous structure will be obtained, than can be given in a description. The tibia is of the left leg.

12. There is an articulating epiphysis, which appears to have been attached to the inferior head of a tibia; but is unlike any portion of bone of that kind that has come under my observation. It presents a large articulating surface, still covered with dark coloured cartilage; there is a short internal maleolus, separated from the articulating surface anteriorly by a deep groove for the passage of a strong tendon, and two other grooves, situated laterally and rather posteriorly; there is also a small articulating surface projecting obliquely upward and outward from the exterior border; the bone is convex anteriorly, and concave posteriorly. It appears too large to have formed a part of the tibia just described; pl. 14. fig. 23.

13. The Os calcis presents some analogy in general contour to that of the Badypus tridactylus, but is proportionably much shorter, as will be seen by referring to the table of dimensions; it presents three articulating surfaces for attachment to the astragalus; superior, inferior, and exterior. Vid. pl. 14. fig. 24. The inferior border is concave; the superior, probably, an oblique plain; (this portion being fractured.) The posterior and inferior extremity is inclined inwards. Vid. pl. 14. fig. 25.

14. The inferior maxilla of a Bear, found in "White Cave," is introduced here, as it displays appearances of an antiquity nearly equal to that of the bones of the Megalonyx. It appears to have belonged to the common black Bear, (Ursus Americanus,) pl. 14. fig. 26.

Our animal with the teeth constructed after the manner of the Sloth, presents in the remaining portions of the skeleton, a singular admixture of characters peculiar to the Ant-eater, the Armadillo, and the Orycteropus.

In size, the adult of the present species surpasses the Megalonyx of Jefferson, being about one third less than the Megatherium. It possesses peculiarities of organic structure, which certainly entitle it to rank as a distinct species; indeed a minute examination of the tooth and knee joint, render it not improbable, supposing the last named character to be peculiar to it, that if the whole frame should

hereafter be discovered, it may even claim a generic distinction; in which case, either Aulaxodon, or PLEURODON, would not be an inappropriate name; referring to the ribbed or fluted form of the mesial aspect of the tooth, M. Desmarest's most prominent character of this genus, viz. "Molars cylindrical," will not apply to this animal. In every instance, when it could be accomplished with any degree of certainty, an attempt has been made to restore the fractured portions of bone, by introducing dotted lines.

The fossil humerus disinterred at Big-bone-lick, and which appears to have belonged to an adult individual of the present species, is nineteen inches in length; the same bone of the Megatherium is twenty-six inches and four tenths; the height of the whole skeleton of the latter, according to CUVIER, being seven feet four inches and five tenths; which would give to the new animal, a height of about five feet, supposing the existence of similar proportions. The radius of the new animal, (being part of the young skeleton found in "White Cave") is about one sixth less than that of the M. Jeffersonii; and the individual to which it belonged, may have been about the size of the common ox, although it was not more than three fourths grown, if we are permitted to judge from comparisons made on the size of the os humeri, and metacarpal bone of the fossil animal found at Big-bone-lick, with those from White Cave.

The laws of co-existence, when applied to estimate the relative proportions of animals, must of course be admitted with some limitation, these proportions being known to vary according to age, and other circumstances. Thus the legs of the colt are proportionably much longer than those of the horse; and were we to conclude from the extreme size of the internal condyle of the os humeri of the *Orycteropus*, that the claws of this animal are equally developed with some others of the same order, the conclusion would be erroneous. Further, the bones of the fore arm of the new Megalonyx, (young specimen) are actually smaller than those of the M. Jeffersonii, yet the claws of the former are absolutely larger and stronger. Indeed, as Cuvier has already remarked, there exists exceptions to all those general laws of co-existence, so admirably established by his boundless penetration. Thus, to the general law, "Ruminant animals furnished with sharp canines are destitute of horns," are opposed the examples found in the Cervus *moschatus*, and in the subgenus, Rusa. Again, "Ruminants alone are characterized by cloven hoofs"—the genus *Sus* furnishes an example directly at variance with this rule. Such exceptions however stand in relation to the whole system, as "spots in the sun;" the only surprise is, that they do not more frequently occur. In fine, the deeper we enter into the study of this

most important and deeply interesting department of knowledge, based as it is, on the unerring principles of geometrical and mathematical science, the more cause we find to look up with admiration to that "Master Spirit," which diffusing itself through every department of animated nature, has conferred upon this, a dignity, order, and utility, equalled only by the science of astronomy; and which certainly cannot be surpassed by any pursuit that may occupy the mind of man.

# TABLE OF DIMENSIONS.

## LARGE CLAW.

| | Inches. |
|---|---|
| Length of the largest Claw | 6. 8 |
| Height | 3. 4 |
| Length of articulating surface along the cord of the arch | 1. 6 |
| Breadth of the same | 1. 6 |

## SMALL CLAW.

| | |
|---|---|
| Length | 6. 0 |
| Height | 2. 0 |
| Length of articulating surface along the cord of the arch | 1. 1 |
| Breadth | 1. 1 |

## RADIUS.

| | |
|---|---|
| Length without inferior head | 12. 6 |
| Greatest width | 3. 1 |
| Thickness | 1. 0 |

## MOLAR TOOTH.

| | |
|---|---|
| Length of the fragment | 2. 3 |
| Antero-posterior diameter | 1. 4 |
| Transverse | 0. 8 |

## HUMERUS

From Big-bone-lick.

| | |
|---|---|
| Length | 19. 0 |
| Greatest diameter of its shaft | 3. 0 |
| ———— of superior head | 5. 5 |
| Breadth of inferior head, about | 9. 0 |
| Long diameter of the foramen in the internal condyle | 2. 0 |
| Short or transverse diameter | 1. 0 |
| Diameter of superior articulating surface | 4. 0 |
| Length of articulating surface of inferior head | 6. 0 |
| Distance of the extremity of the internal condyle from the centre of the shaft | 6. 0 |

## HUMERUS

from White Cave, without epiphyses.

| | |
|---|---|
| Length | 12. 8 |
| Diameter of the shaft | 2. 0 |

## METACARPAL BONE

from Big-bone-lick.

| | |
|---|---|
| Length | 5. 0 |
| Long diameter of anterior head | 2. 5 |
| Short diameter | 1. 5 |

## SCAPULA.

| | |
|---|---|
| Length of the spinal border not following its curvature, about | 13. 0 |
| Posterior border | 9. 0 |
| Anterior border | 9. 0 |
| Height of scapula from the centre of the spinal border, to glenoid cavity, about | 11. 0 |
| Length of glenoid cavity | 3. 5 |
| Transverse diameter | 2. 0 |
| Height of the spinous process | 3. 0 |
| Length of the acromion process | 3. 0 |
| Breadth | 1. 5 |

## RIB.

| | |
|---|---|
| Breadth of the head of the first rib | 3. 8 |
| ———— of articulating surface | 2. 3 |
| Length of the false rib following its curvature | 29. 0 |
| Breadth | 1. 5 |

## VERTEBRÆ.

Height of a dorsal vertebra

| | |
|---|---|
| from the base of the body to the apex of the spinous process | 7. 0 |
| Diameter of the body | 2. 5 |
| ——— of the spinal canal | 2. 0 |

### FEMUR.

| | |
|---|---|
| Greatest breadth of the inferior head | 8. 6 |
| Diameter of the internal condyle | 3. 0 |
| ——— external | 2. 0 |
| Breadth of the rotuline surface | 3. 3 |

### TIBIA.

| | |
|---|---|
| Length, about | 10. 0 |
| Transverse diameter of the superior head | 6. 4 |
| Antero-posterior diameter across the external condyle | 5. 0 |
| Transverse diameter of the middle of the bone | 2 7 |
| Antero-posterior diameter | 1. 7 |

### TIBIAL EPIPHYSIS.

| | |
|---|---|
| Transverse diameter | 5. 3 |
| Antero-posterior diameter | 2. 7 |

### OS CALCIS.

| | |
|---|---|
| Length | 5. 5 |
| Height of articulating surfaces | 4. 0 |
| Breadth of the same | 3. 3 |
| Height of the body of the bone | 3. 0 |

## EXPLANATION OF THE PLATES.

PLATE XII. Fig .1. Ungueal phalanx of the medius finger.
2. View of the inferior surface of the same.
3. and 4. Lateral views of the annular phalanx.
5 Radius, anterior view.
6. Radius, posterior view.
7. Molar tooth, external lateral view.
8. ———————, interial lateral view.
9. Crown of the tooth.

PLATE XIII. 10. Humerus from Big-bone-lick.
11. Humerus from White Cave.
12. Scapula.
13. Metacarpal bone of the index finger, back view.
14. ——————— anterior articulating surface.

PLATE XIV. 15. First rib.
16. False rib.
17. Posterior dorsal vertebra.
18. Lumbar vertebra.
19. Condyles of the Femur.
20. Tibia, posterior view.
21. ——, interior view.
22. ——, articulating surface.
23. Epiphysis from the inferior head of a Tibia.
24. Os calcis, articulating surface.
25. ——————— lateral view.
26. Inferior maxilla of a Bear.

## *Description of an extinct Species of* Fossil Vegetable, *of the family Fucoides. By* R. Harlan, *M. D. &c.*

[Read March 8th, 1831.]

Ord. Nat. ALGÆ. Cryptogamæ aquaticæ, plerumque marinæ; fronde inarticulata et carnosa; familias *Ulvacea* et *Fucacea* formant.

Fam. *Fucoides*,[1] Sternb. *Algacites*, Schloth. "Frons continua, nunquam articulata, plerumque difformis, nec symmetrica; aut subcylindrica, simplex vel sæpius ramosa, nuda vel rarius folia sustinens; aut membranacea, integra seu magis minusve lobata, nervis nullis vel imperfecte notatis, vage ramosis nec unquam anastomosantibus percursa. Fructificatio, dum exstat, punctiformis vel vesiculas sessiles aut pedicillatus efformans."—(*Brongn.*)

Sect. *Cladorytes.** Stipes ramosus; ramis subcylindraceis, transverse rugatis.

Fucoides *Alleghaniensis.** Fronde compressa, rugata; apice recurva, obtusa; ramis inequalibus, digitatis et fastigiatis, enervibus, nudatis.

*Place in the Series.*—Compact sandstone, subjacent to the coal formations.

*Locality.*—One of the eastern ridges of the Alleghany mountains, about 40° north latitude, and about 77° west longitude, from Greenwich; one

[1] Including a general group of Fossil Algæ.

hundred and fifty miles from Philadelphia; ten miles east of Lewistown, north side of the Juniata river, Mifflin county, state of Pennsylvania.

This fossil Fucus presents one of the richest specimens of vegetable organic remains, that has hitherto come under my notice; not only is there a fragment of stone two and a half feet long by one and a half feet wide, with the surface completely crowded with the forms of this plant, but they lie upon each other three or four layers deep, as is demonstrated by a horizontal fracture. (Vid. Pl. XV. Fig. 1.) They project in bold relief from the surface, with their distal extremities disposed in every direction; they appear to have been of different ages, and vary in size accordingly from two to five inches in length, the largest being eight tenths of an inch in thickness. In breadth they vary from one to five tenths of an inch: they are generally gently arched from the base towards the apex, and more or less recurved at top; in every instance the apex is curved downwards and sinks into the stone. The superior surface of both the stalk and branches is cylindrical, transversely wrinkled by irregular channels, and marked by a longitudinal depressed line.

The most perfect and distinct specimen has been selected and figured, of the natural size, in order to display the digitations of the stalk, and fasciculation of the branches; (Vid. Pl. XV. fig. 2.) They have

grown in such profusion and are so crowded together that the commencements or bases of the stalks are for the most part concealed; so that in this specimen which is five inches long, the stalk of the plant, previous to the first digitation or branch, is only seven tenths of an inch in length; the largest stalk exposed to view being one inch and eight tenths.

The branches are all compressed laterally as well as the stalk, (Pl. XV. fig. 3.) and are fasciculated or closely applied side by side at the commencement, and gradually diverge more or less towards their distal extremities, and in the present instance are given off in the following order commencing from the right,—one—two—three, gradually increasing in size; descending again to the stalk, there is a much larger branch, which soon subdivides into four irregular branches of various sizes: but in this respect there exists no uniformity: in every case, however, the stalks very soon divide into two or more branches; the latter are more or less wrinkled apparently according to age, the rugæ being more or less obsolete in the largest,—profoundly developed in the smaller or younger specimens.

The plants are fractured in many places, and in various directions, but the fractured portions do not display any evidence of organization; nor is there any appearance of leaves, nervures, or fructification. The mass of the fragment of rock in which these fossils occur, is about half a foot in thickness,

and weighs something less than two hundred pounds; it is of a very compact texture, and readily strikes fire under the hammer. When I first observed this geological specimen, on my return from an excursion to the Alleghany Mountains in the month of August of the past year, it constituted part of a pavement before the door of a tavern: the landlord informed me, that the stone came rolling down the mountain, (which is here very precipitous) within a few yards of the house, and that viewing it as a very ornamental specimen, he had placed it in the earth before his door to attract public notice; and I confess that at the short distance in which I first viewed the specimen, it appeared to represent a beautiful piece of artificial sculpture. There exists a vertical fracture on one portion of the stone, which has evidently occurred subsequently to the petrifaction of the plants, and is filled at present with quartz, forming an irregular vein.

Brongniart, has already determined with sufficient accuracy, the existence of thirty-six species of fossil Fuci. (Vid. Histoire des végétaux fossiles, ou Recherches Botaniques et Geologiques sur les végétaux renfermés dans les diverses couches du globe. Par M. Adolphe Brongniart.)

To this author, together with the work of Baron Sternberg, I have been indebted for details of great interest concerning these extinct vegetable species. M. B. confesses his inability to divide this family

into distinct genera, inasmuch as the characters proper to define them accurately, occur too rarely to admit of a precise classification; but he has divided the general group of fossil Algæ, to which has been given the name "*Fucoides*," into sections, founded on the form of the branches; which sections are found to correspond with sufficient accuracy to one or more genera of living ALGÆ.

Only two species of fossil Fuci, have been hitherto observed in North America, viz: F. *dentatus*, and F. *Serra*. M. B. describes these as occurring in the "Transition limestone of Canada," and as being very different from any of the existing species. Both in the north of America and of Europe these fossils have been discovered in some of the most ancient strata of the globe. In Europe, among the lower secondary formations (terrains de sediment inférieur), the bituminous Schists of Mansfield, and the anthracite coal mines of Scania, are the only strata which contain impressions of Fuci. They become more common in the strata which separate the Jura limestone from the chalk, where some remarkable species have been discovered. According to M. Keferstein, the "Grauwake" of the Apennines, which often contains Fuci, belongs to the transition formations, which, judging from its relations to the carboniferous limestone enclosing belemnites, probably corresponds to the Lais formations.

At Bignor, in England, these fossils are found in the *Ferruginous sand*, according to M. Greenough;

and at Voisons, Switzerland, according to M. M. Dufresnoy and Elie de Beaumont, they are found in the green sand formation, which separates the Jura limestone from the chalk.

M. Brongniart remarks, that if we admit these fossil Fuci to belong to an epoch nearly contemporaneous with the marine lignites underlying the chalk of the isle of Aix, the submarine flora which characterizes this period indicates a vegetation very different from that of the existing species on those coasts, and which approaches rather to those of the equatorial regions, than to those of the frigid zone.

In the chalk itself only a single vestige of a plant of this family, the "F. *lyngbyanus*," has been discovered; this appears allied to a genus peculiar to the equatorial regions. In examining the fossil Algæ of the superior secondary regions, M. Brongniart arrives at a very different result: most of these species are from Monte-Bolca, and display great analogy to those genera at present existing on the Mediterranean coasts. Thus "marine vegetation, like the terrestrial, displays stronger affinity to that of our climate in proportion as the formations in which they occur are more recent. They present, on the contrary, characters more analogous to those of the vegetation of equatorial climates, in proportion as they belong to an epoch of more ancient formation."

In the course of the present investigation I have been led further to admire the great harmony that

is found to preside over all the laws which regulate organic life. It may be readily anticipated to what immense extent the study of fossil botany, added to that of fossil zoology is calculated not only to enlighten us as regards the antediluvian climates, but to direct us finally to a certain knowledge of the comparative ages of the various strata which constitute the crust of the globe we inhabit.

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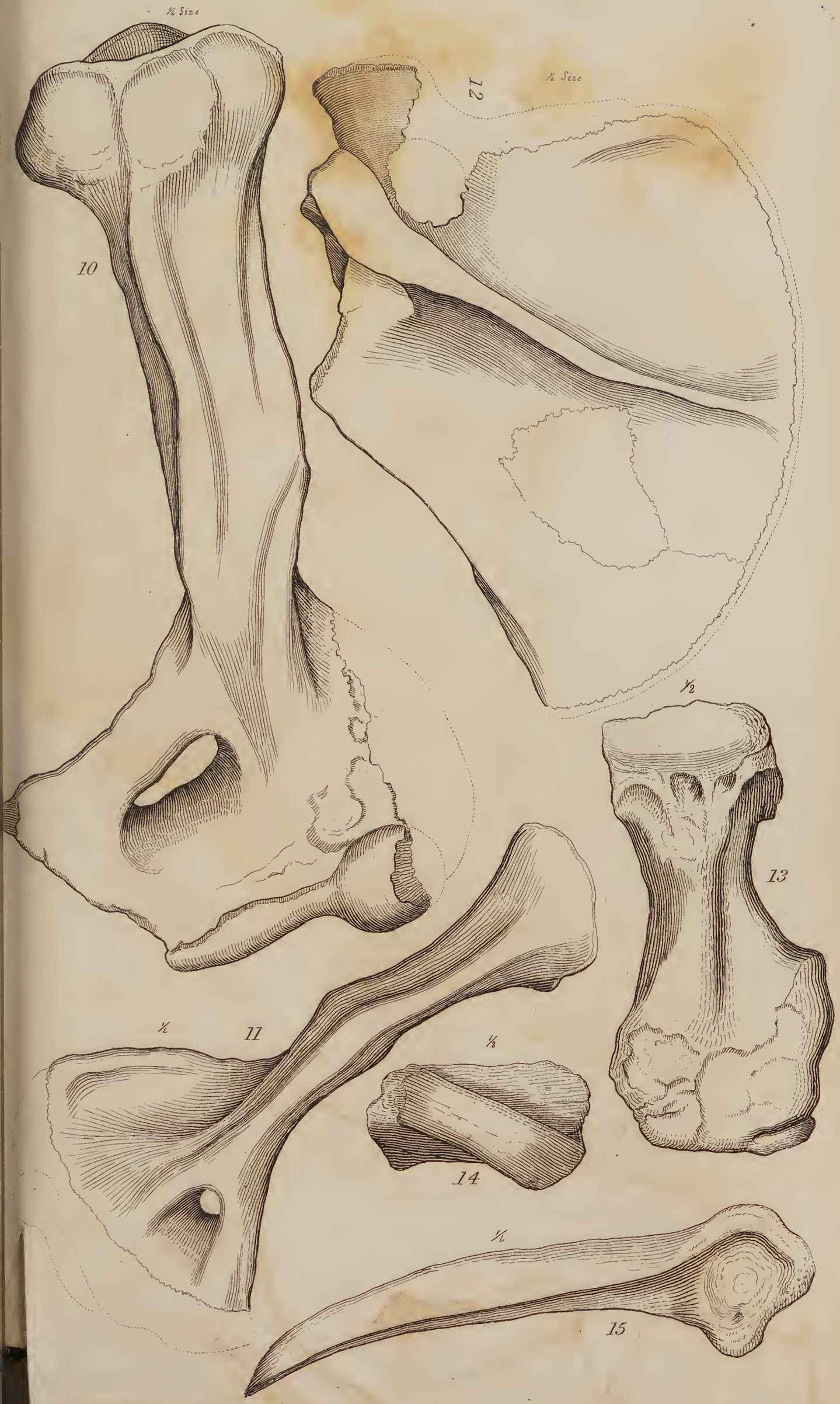
## EXPLANATION OF PLATE XV.

Fig. 1st. A general view of the surface of the stone containing the fossil plants.

2nd. A single plant of the natural size; anterior view.

3d. A lateral view of one of the branches.


5
½ Size
2
½
6
½
½
3
½
4
½
1
8 b.
Natural Size
7 a.
9 c.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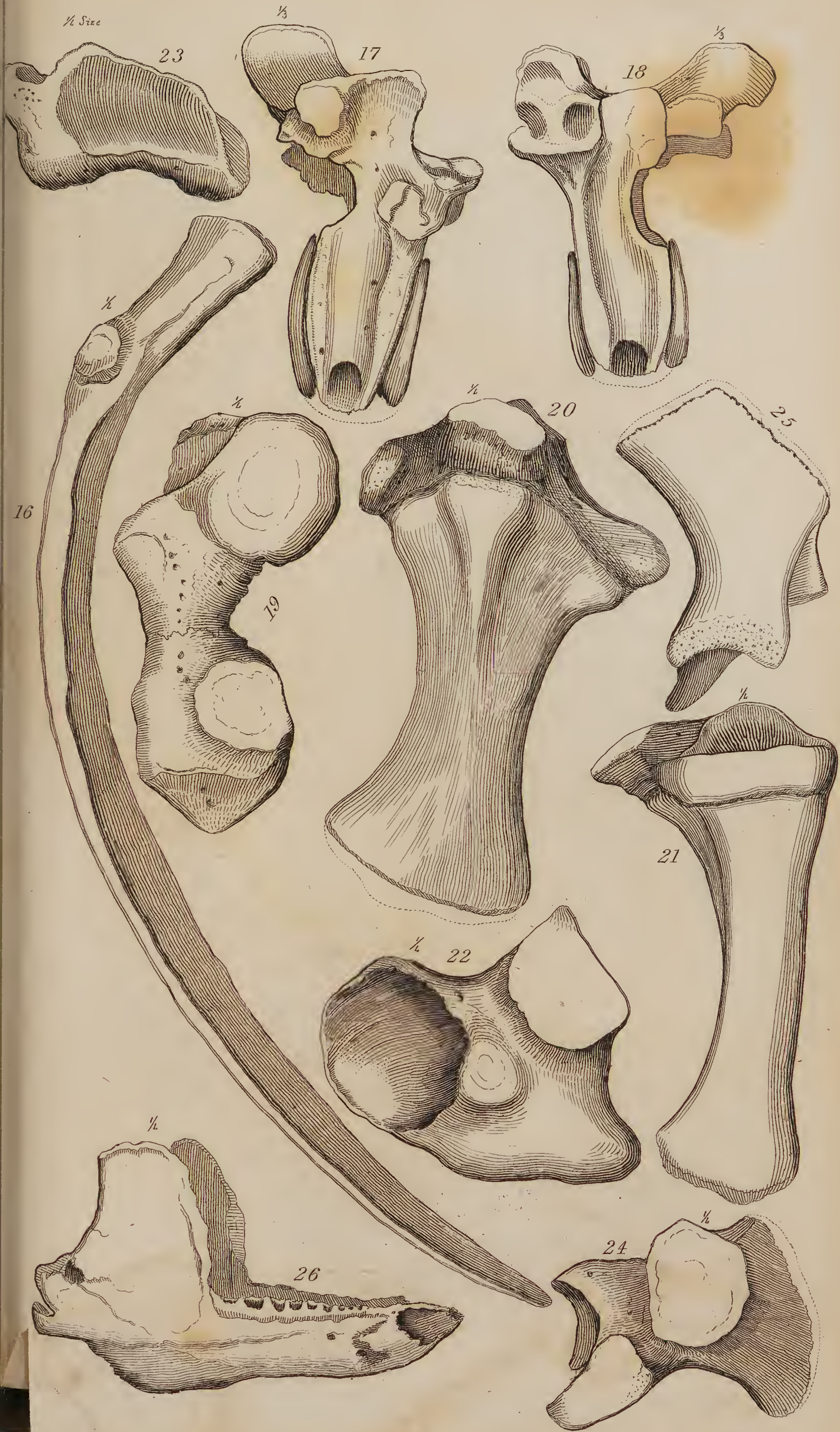
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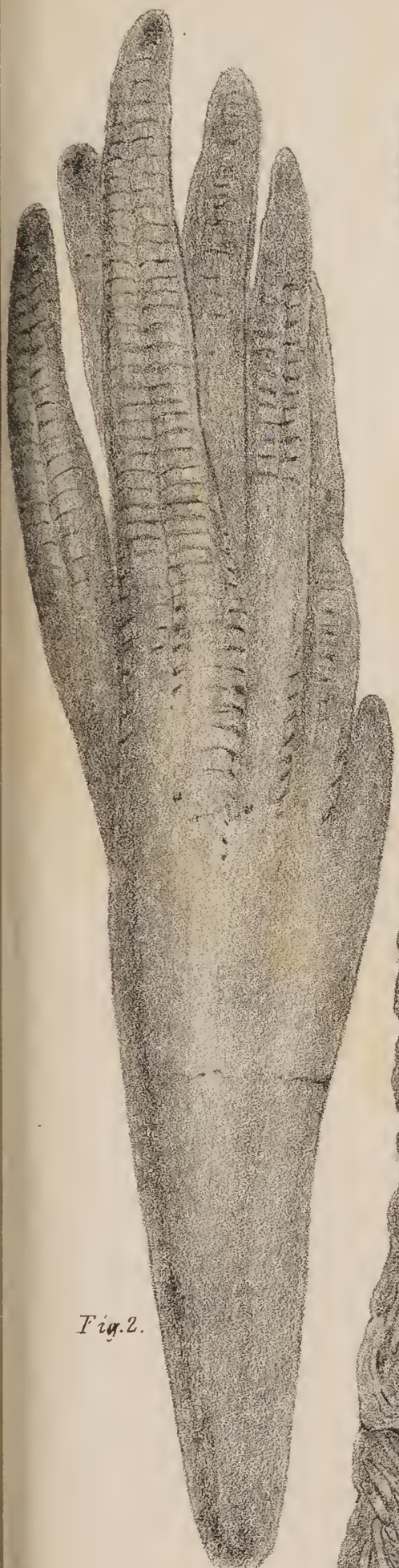

Fig. 2.

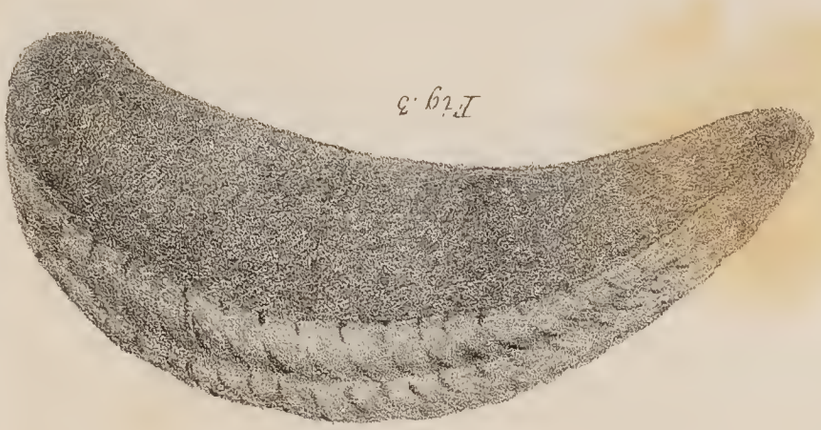

Fig. 3

Fig. 1.

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